Conventional processes for forming solder bumps, however, typically involve photolithography, electroplating and wet chemical etching steps. Processes of the this type are not entirely satisfactory for a number of reasons, including (1) the requirement of chemical processing steps, (2) the use of numerous processing steps, and (3) high lead usage, which can lead to higher costs and adverse environmental impact.

Please replace the paragraph starting on page 8, line 4 with the following paragraph;

A specific example in which numerous solder-coated articles are attached to a semiconductor substrate follows. First, 68+/-5 micron copper coated glass spheres (e.g., product number GL-263 from Mo-Sci Corp.) Are obtained and coated by barrel electroplating with a solder layer comprising 63% Sn and 37% Pb to provide solder-coated articles. A wafer with solder pads (in this example, a silicon wafer comprising Ti(550°Å)/Pt(1000 Å)/Au(2000 Å) solder pads as well as nitride and benzocyclobutene (BCB) passivation/moisture layers) is preheated to a temperature of about 100°C. The solder-coated articles are then placed into an open container forming a monolayer of spheres in the container. Adjacent to this container is another shallow container containing a specified volume of flux. A dual head assembly is then provided, which contains (1) a pick-up tool and (2) a bed of small round cylinders. The pick-up tool consists of

a Teflon/stainless steel sheet machined with .002-inch (i.e., approximately 50 micron) diameter through-holes. The location and number of the holes will match location on the wafer where the solder spheres are to be attached (i.e., the solderable pads). The bed of cylinders is arrayed in the same fashion so as to contact the solderable pads on the wafer. Equipment of this type is well known in the art of BGA (ball grid arrays) for placement of solder balls on printed circuit boards.

Please replace the paragraph starting on page 8, line 21 with the following paragraph

The dual head assembly operates such that (1) the bed of cylinders is lowered into the container of flux, contacting the surface of the flux and (2) at the same time, a vacuum is applied to the pick-up tool as it is dipped into the container of spheres, causing each hole of the pick-up tool to be filled with a single solder-coated article. Using a pattern recognition system, the head with the flux-coated bed of cylinders in aligned over the wafer. Upon a slight vertical motion, the tip of each cylinder contacts each solderable pad on the wafer, leaving a certain volume of flux on the pad. Once complete, this head is raised and the pick-up head with the spheres is then located directly over the flux coated solder pads on the wafer. The pick-up head is then lowered gently until the base of each solder coated sphere contacts the flux. The vacuum in the pick-up head

is then shut off and the pick-up head is raised, leaving the spheres on the flux coated solder pads on the wafer. The wafer is then shuttled through a tunnel oven set with the appropriate reflow temperature profile.

In the Claims

Please amend claim 1 as noted below.

A solder-coated article comprising:

a substantially non-deformable dielectric core having a largest dimension ranging from 1 to 1000 microns;

a solderable metal layer over said core; and

a solder layer over said metal layer.

Please amend claim 9 as noted below.

A modified substrate comprising:

a substrate;

a metalized pad on said substrate; and

a bump feature on said metalized pad, said bump feature comprising a substantially non-deformable dielectric core; a solderable metal layer over said core; and a solder region contacting at least a portion of said solderable metal layer and at least a portion of said metalized pad.

Please amend claim 16 as noted below.